CLAIMS

What is claimed is:

1   1.    An apparatus comprising:

2       a data word extractor to successively extract a first plurality of data word

3   groups from a stream of input data, one data word group at a time, with each

4   extracted data word group having a group size of at most n bytes, where n is an

5   integer;

6       a plurality of CRC calculation assemblies coupled to the data word extractor

7   to be selectively employed to incrementally calculate a CRC value for the first

8   plurality of data word groups, the calculation being iteratively performed, one

9   iteration at a time, and for each iteration, the selection of the CRC calculation

10  assemblies being made in accordance with the group size of the data word group

11  extracted for the iteration,;

12      a plurality of storage elements correspondingly coupled to the plurality of

13  CRC calculation assemblies to correspondingly store the results generated by the

14  corresponding ones of the CRC calculation assemblies for one iteration of the

15  iterative calculation; and

16      a plurality of selectors coupled to storage elements and the plurality of CRC

17  calculation assemblies to selectively re-circulate one of the stored results back to

18  the selected one of the CRC calculation assemblies for the next iteration of

19  calculation, and to selectively output one of the stored results as the calculated CRC

20  value at the end of the iterative calculation.

1    2.    The apparatus of claim 1, wherein the plurality of CRC calculation assemblies

2    comprise a first CRC calculation assembly coupled to the data word extractor to

3    incrementally calculate the CRC value for said first plurality of data word groups for

4    an iteration, whenever the data word extractor extracts a data word group of n/2 or

5    less bytes for the iteration, where n is an even integer.


1    3.    The apparatus of claim 2, wherein the first CRC calculation assembly

2    comprises less than n/2 CRC calculators coupled to each other in a cascaded

3    manner to be selectively employed in combination in at least some of the time to

4    incrementally calculate the CRC value for said first plurality of data word groups for

5    an iteration, whenever the data word extractor extracts a data word group of n/2 or

6    less bytes for the iteration.


1    4.    The apparatus of claim 2, wherein the first CRC calculation assembly

2    comprises n/2 CRC calculators to be selectively employed exclusively to

3    incrementally calculate the CRC value for said first plurality of data word groups for

4    an iteration, whenever the data word extractor extracts a data word group of n/2 or

5    less data bytes for the iteration.


1    5.    The apparatus of claim 2, wherein the plurality of CRC calculation assemblies

2    further comprise a second CRC calculation assembly coupled to the data word

3    extractor to incrementally calculate the CRC value for said first plurality of data word

4    groups for an iteration, whenever the data word extractor extracts a data word group

5    of more than n/2 bytes for the iteration.

1  6.      The apparatus of claim 5, wherein the second CRC calculation assembly

2  comprises less than n/2 CRC calculators to be selectively employed in combination

3  at least some of the times to incrementally calculate the CRC value for said first

4  plurality of data word groups for an iteration, whenever the data word extractor

5  extracts a data word group of more than n/2 bytes for the iteration.


1  7.      The apparatus of claim 5, wherein the second CRC calculation assembly

2  comprises n/2 CRC calculators to be selectively employed exclusively to

3  incrementally calculate the CRC value for said first plurality of data word groups for

4  an iteration, whenever the data word extractor extracts a data word group of more

5  than n/2 bytes for the iteration.


1  8.      The apparatus of claim 2, wherein the data word extractor also extracts a

2  second plurality of data word groups, and the plurality of CRC calculation

3  assemblies further comprise a second CRC calculation assembly coupled to the

4  data word extractor to incrementally calculate a CRC value for the second plurality

5  of data word groups, for an iteration, whenever the data word extractor extracts for

6  the second plurality of data word groups, a data word group of n/2 or less bytes,

7  where n is an even integer.


1  9.      The apparatus of claim 1, wherein the plurality of selectors comprise

2  a first selector coupled to the storage elements and the plurality of CRC

3  calculation assemblies to selectively re-circulate one of the stored results back to

4  the selected one of the CRC calculation assemblies for the next iteration of

5  calculation, and

6    a second selector coupled to the first selector to cooperate with the first

7    selector to selectively output one of the stored results as the calculated CRC value

8    at the end of the iterative calculation.


1    10.    The apparatus of claim 1, wherein n equals 8.


1    11.    The apparatus of claim 1, wherein the apparatus is disposed on an integrated

2    circuit.


1    12.    A method comprising:

2    successively extracting a first plurality of data word groups from a stream of

3    input data, one data word group at a time, with each extracted data word group

4    having a group size of at most n bytes, where n is an integer;

5    selectively employing a plurality of CRC calculation assemblies coupled to the

6    data word extractor to incrementally calculate a CRC value for the first plurality of

7    data word groups, with the calculation being iteratively performed, one iteration at a

8    time, and for each iteration,  selecting the CRC calculation assemblies in

9    accordance with the group size of the data word group extracted for the iteration;

10    correspondingly storing the results generated by the plurality of CRC

11    calculation assemblies for one iteration of the iterative calculation into a plurality of

12    storage elements; and

13    selectively re-circulating one of the stored results back to the selected one of

14    the CRC calculation assemblies for the next iteration of calculation, and selectively

15    outputting one of the stored results as the calculated CRC value at the end of the

16    iterative calculation.

1    13.    The method of claim 12, wherein said selective employment of a plurality of

2    CRC calculation assemblies comprise selecting a first CRC calculation assembly to

3    incrementally calculate the CRC value for said first plurality of data word groups for

4    an iteration, whenever the data word extractor extracts a data word group of n/2 or

5    less bytes for the iteration, where n is an even integer.


1    14.    The method of claim 13, wherein said selective employment of the first CRC

2    calculation assembly comprises selectively employing a combination of less than n/2

3    CRC calculators to incrementally calculate the CRC value for said first plurality of

4    data word groups for an iteration, whenever the data word extractor extracts a data

5    word group of n/2 or less bytes for the iteration.


1    15.    The method of claim 13, wherein said selective employment of the first CRC

2    calculation assembly comprises selectively employing one of n/2 CRC calculators to

3    to incrementally calculate the CRC value for said first plurality of data word groups

4    for an iteration, whenever the data word extractor extracts a data word group of n/2

5    or less data bytes for the iteration.


1    16.    The method of claim 13, wherein said selective employment of the plurality of

2    CRC calculation assemblies further comprise selecting a second CRC calculation

3    assembly to incrementally calculate the CRC value for said first plurality of data

4    word groups for an iteration, whenever the data word extractor extracts a data word

5    group of more than n/2 bytes for the iteration.


1    17.    The method of claim 16, wherein said selective employment of the second

2    CRC calculation assembly comprises selecting a combination of less than n/2 CRC

3   calculators to incrementally calculate the CRC value for said first plurality of data

4   word groups for an iteration, whenever the data word extractor extracts a data word

5   group of more than n/2 bytes for the iteration.

1   18.    The method of claim 16, wherein said selecting of the second CRC

2   calculation assembly comprises selecting one of n/2 CRC calculators to

3   incrementally calculate the CRC value for said first plurality of data word groups for

4   an iteration, whenever the data word extractor extracts a data word group of more

5   than n/2 bytes for the iteration.

1   19.    The method of claim 13, wherein said extraction further comprises extracting

2   a second plurality of data word groups, and said selective employment of the

3   plurality of CRC calculation assemblies further comprise selecting a second CRC

4   calculation assembly to incrementally calculate a CRC value for the second plurality

5   of data word groups, for an iteration, whenever the data word extractor extracts for

6   the second plurality of data word groups, a data word group of n/2 or less bytes for

7   the iteration, where n is an even integer.

1   20.    An apparatus comprising:

2        a plurality of processing units to correspondingly process a plurality of

3   network traffic flows; and

4        a shared CRC generation block coupled to the processing units to alternately

5   generate a CRC value for a data block of a selected one of the network traffic flows,

6   the shared CRC generation block including at least one CRC generation unit that

7   iteratively generate a first CRC value for the data block of the selected one of the

8   network traffic flows, the at least one CRC generation unit including a plurality of

9    CRC calculation assemblies to be selectively employed to incrementally calculate a

10   CRC value for a first plurality of data word groups, the calculation being iteratively

11   performed, one iteration at a time, and the selection of the CRC calculation

12   assemblies for the various iterations being made in accordance with group sizes of

13   extracted data word groups of the first plurality data words for the various iterations.

1    21.   The apparatus of claim 20, wherein the plurality of CRC calculation

2    assemblies comprise a first CRC calculation assembly coupled to the data word

3    extractor to incrementally calculate the CRC value for said first plurality of data word

4    groups for an iteration, whenever a group size of a data word group of said first

5    plurality of data word groups is n/2 or less bytes for the iteration, where n is an even

6    integer.

1    22.   The apparatus of claim 21, wherein the first CRC calculation assembly

2    comprises less than n/2 CRC calculators coupled to each other in a cascaded

3    manner to be selectively employed in combination in at least some of the times to

4    incrementally calculate the CRC value for said first plurality of data word groups for

5    an iteration, whenever a group size of a data word group of said first plurality of data

6    word groups is n/2 or less bytes for the iteration.

1    23.   The apparatus of claim 21, wherein the first CRC calculation assembly

2    comprises n/2 CRC calculators to be selectively employed exclusively to

3    incrementally calculate the CRC value for said first plurality of data word groups for

4    an iteration, whenever a group size of a data word group of said first plurality of data

5    word groups is n/2 or less data bytes for the iteration.

1   24.    The apparatus of claim 21, wherein the plurality of CRC calculation

2   assemblies further comprise a second CRC calculation assembly coupled to the

3   data word extractor to incrementally calculate the CRC value for said first plurality of

4   data word groups for an iteration, whenever a group size of a data word group of

5   said first plurality of data word groups is more than n/2 bytes for the iteration.


1   25.    The apparatus of claim 24, wherein the second CRC calculation assembly

2   comprises less than n/2 CRC calculators to be selectively employed in combination

3   at least some of the times to incrementally calculate the CRC value for said first

4   plurality of data word groups for an iteration, whenever a group size of a data word

5   group of said first plurality of data word groups is more than n/2 bytes for the

6   iteration.


1   26.    The apparatus of claim 24, wherein the second CRC calculation assembly

2   comprises n/2 CRC calculators to be selectively employed exclusively to

3   incrementally calculate the CRC value for said first plurality of data word groups for

4   an iteration, whenever a group size of a data word group of said first plurality of data

5   word groups is more than n/2 bytes for the iteration.


1   27.    The apparatus of claim 21, wherein the plurality of CRC calculation

2   assemblies further comprise a second CRC calculation assembly to incrementally

3   calculate a CRC value for a second plurality of data word groups, for an iteration,

4   whenever a group size of a data word group of the second plurality of data word

5   groups is n/2 or less bytes for the iteration, where n is an even integer.

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